**Lesson 4 – Selection and Adaptation (Kyle Barrett)**

**Overview** - This lesson explores the forces that select for certain phenotypic traits. These forces can be either naturally occurring or artificially introduced (as in selective breeding). Both forces of selection result in adaptation of the population over time. Students will use a guided note taking sheet during the PowerPoint presentation of these key concepts. A classroom simulation will further clarify the concept of natural selection.

**Standards –** Standards are those provided in the “Next Generation Science Standards”. Learning objectives based on standards specifically applicable to this lesson:

NGSS HS-LS4-4: Students will be able to construct an explanation based on evidence for how natural selection leads to adaptation within populations.

NGSS HS-LS4-5: Students will be able to contrast environmental sources of selection pressure that affect populations of living organisms, leading to expansion, speciation, or extinction.

**Materials / Preparation Checklist**

PowerPoint Presentation (teacher prepared)

Computer and projector for PowerPoint presentation

Whiteboard for additional explanations / descriptions (as needed)

Whiteboard markers

Natural Selection Note-taking Guide

Giraffe simulation instruction sheets and data record

Construction paper “leaves”

Prepared calibrated wall chart for measuring “giraffe” heights

**Objectives**

|  |  |  |
| --- | --- | --- |
| Objective | How I will assess during lesson. | How I will assess after lesson. |
| Define natural selection, artificial selection, and adaptation | Provide scaffolding as needed during discussions / brainstorming | Selected students provide definitions of terms, open to refinement by other students or teacher |
| Students assess how environmental pressures select for phenotypes | Expand upon content when informal instant assessment suggests student confusion | Students describe what aspects of natural selection were evident in simulation |
|  |  | Students complete data analysis and associated question sheet |

**Opening**

**HOOK:** Students will be greeted as they enter; construction paper “leaves” will be hanging at various heights from the ceiling. Students will be asked to leave them alone until later in the lesson. On the board will be projection of four common plants: broccoli, cauliflower, cabbage, and Brussels sprouts. Students will be asked to enter into their journals their observations concerning these plants, with encouragement to “think outside the box” (i.e. come up with more than they “are all vegetables”).

Once they begin, “housekeeping” will occur, with attendance taken and any other administrative actions completed. Lesson 3 homework (graphic organizers) will be collected.

Upcoming Requirements: On the board will be a reminder that the Unit Assessment will occur during the 7th class meeting for this unit (a week from Thursday). Also, the board will convey that the lesson 3 essay will be due on Friday.

Day Goals: The “Key Take-Aways” will be listed on the board: Natural Selection, Artificial Selection, Adaptation

Transition: Students will report out their observations of the four plants. It will be revealed that they are in fact all the same species, artificially selected for their specific phenotypes. Students will be asked if they know of another common species with many, many variants that widely differ. If necessary, hints will be given so they come up with the answer “dogs”.

**Instruction**

|  |  |  |
| --- | --- | --- |
| Instructional  Step | Teacher Actions/Questions (I will do/say...) | Student Actions/Instructions (Student will...) |
| 1 | Provide a PowerPoint brief on artificial selection, natural selection, and adaptation | Take notes |
| 2 | Ask questions during presentation, and refer frequently to earlier lessons to activate prior knowledge | Respond to questions  Generate questions |
| 3 | Distribute worksheets on natural selection | Independently complete worksheets |
| 4 | Monitor student performance during seatwork | Submit worksheet upon completion |
| 5 | Distribute classroom simulation instructions; read over them with class | Complete simulation activities |
| 6 | Direct and monitor students actions as needed during simulation | Collect data during simulation |
| 7 | Upon completion of simulation, direct students into predetermined small groups | Students begin work on simulation summary sheet |
| 8 | Select representatives from each group to provide the group’s answers to the various questions | Selected students provide requested answers |
| 9 | Select other students to provide further explanation of the group’s rationale for their answer | Selected students explain responses |

**Accommodations**

Vocabulary worksheets for ELL or struggling learners will enable them to familiarize themselves with key terms prior to class work. A list of selected video clips will be available for those who are more visual learners (to be viewed at home). These clips will reinforce the key concepts. Students with physical disabilities would be able to participate fully in the classroom simulation, preferably along with other students in the roles of “leaf sources”.

**Closing**

The teacher will ask students to share their definitions of natural selection (their understanding, in their own words). Any confusion will be clarified. Students will be required to complete an exit ticket – “one question you still have about selection or adaptation”. Students will be reminded their lesson 3 essays are due on Friday, and that anyone who had not yet finished their giraffe simulation worksheets could take them home to complete them (also due on Friday).

**Notes / Resources**

This lesson plan is adapted from one created by Nicolle Wambold, Sierra Nevada College

<http://nicollewambold.wikispaces.com/file/view/Evolution+Unit+Plan.pdf/244787767/Evolution%20Unit%20Plan.pdf>

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Natural Selection, Artificial Selection, & Adaptation**

Humans modify other species over many generations be selecting and breeding individuals that possess desired traits. This process is known as

\_\_\_\_\_\_\_\_\_\_\_\_\_.

The above process leads to plants and animals that bear \_\_\_\_\_\_\_\_\_\_ resemblance to their wild ancestors.

Darwin’s 4 Observations of Nature:

1.

2.

3.

4.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a process in which individuals that have certain heritable characteristics survive and reproduce at a \_\_\_\_\_\_\_\_\_\_\_\_ higher rate than other individuals.

What happens to the match between organisms and their environment as a

result of the above process?

If an environment changes, or if individuals move to a new environment,

what may happen?

Do individuals or populations evolve? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What kind of traits can natural selection amplify or diminish?







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